

PACIFIC SOUTHWEST Forest and Range Experiment Station

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LIVESTOCK GRAZING NOT DETRIMENTAL TO MEADOW WILDFLOWERS

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Livestock grazing has a marked effect on mountain meadow ecosystems. Meadows damaged or destroyed during years of indiscriminate livestock use provide ample testimony to this impact. Conversely, their grazing capacity is directly related to their condition.

But meadows can provide more than just forage for livestock. Other important outputs include water, wildlife habitat, and esthetic values. What these values are will vary. To some, the greatest pleasure may come from seeing whitefaced herefords belly deep in "grass"; to others, the most pleasure may come from seeing a meadow aglow with colorful wildflowers.

A preponderance of grass and grasslike plants in a mountain meadow generally suggests an advanced successional stage—and high grazing capacity. Conversely, dense stands of wildflowers suggest a lower successional stage—and lower grazing capacity. How can mountain meadows be managed to provide high levels of beef production as well as large numbers of wildflowers?

A study in the Bogard area, Lassen National Forest, northeastern California, shows that meadows under rest-rotation grazing¹ produced more forage and were in higher successional stages than meadows grazed free choice, which produced more wildflowers. In contrast to free-choice grazing, rest-rotation provides rest periods rotated among range units. On the basis of present knowledge, it is not possible to maximize both beef and wildflower production in mountain meadows. But this study shows that it is possible to manage them so as to have both adequate beef and esthetic values.

STUDY AREAS AND METHODS

The Bogard area lies near the southern end of the Cascade Range. It is characterized by broad, fairly level valleys between pine and fir timbered volcanic peaks. Elevation ranges from 5,600 to more than 7,400 feet. And the mean yearly precipitation is 18.4 inches.²

Abstract: Wildflower growth, meadow conditions, and grazing methods were compared in the Bogard area, Lassen National Forest, northeastern California. The two grazing methods were rest-rotation, in which range units are periodically rested from grazing, and free-choice, in which range units are not provided any rest periods from use. The results suggest that grazing per se need not be detrimental to the growth of wildflowers, and that both adequate beef production and esthetic values can be achieved by finding the right balance between rest and grazing for mountain meadows.

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One of the grazing allotments—Harvey Valley—in this area has been managed under rest-rotation grazing since 1954. At Harvey Valley five range units are used. Only one of these five is grazed for the entire summer grazing season. Two are not grazed at all, one is grazed for the first half of the season, and one the second half. The prescription of rest and rotation is based upon the growth and reproduction requirements of Idaho fescue (*Festuca idahoensis*), the principal forage species.

The allotments around Harvey Valley have continued to be grazed free choice. Livestock have access to all areas of the allotments for the entire summer grazing season. Meadows on these allotments are fully and repeatedly grazed each season and not provided any rest periods from use.

Plots were established on three meadow sites on the Harvey Valley allotment and on three comparable sites on nearby allotments. Comparable sites are ones having about the same basic potentials—given the same treatment—to produce and sustain a given plant community.³ Therefore, we could logically expect any differences between plots in botanical composition and herbage yield to reflect the effects of grazing regimes.

Botanical composition of these meadow plots was determined by using the nearest-plant-to-point technique. Herbage yield was determined by a double sampling procedure that uses clipped quadrats and the Hetrodyne Vegetation Meter.⁴

RESULTS AND DISCUSSION

The results of our studies on the three pairs of plots (table 1) agree with those reported by Crane.⁵ The members of the plot pairs having the greatest herbage yield also had the higher combined percent of grasses and grasslike plants and lower percent of forbs. And in each case, the plot under rest-rotation grazing produced the most herbage and had the better botanical composition.

However, it was the relationship between grasslike plants and forbs which accounted for the differences between the plots. Basal cover measurements (point technique) gave the same relationship as did botanical composition; i.e., basal cover of grasslike plants was significantly greater and of forbs significantly less on the plots under rest-rotation than on those grazed free choice. Differences in basal cover and botanical composition of grasses did not show such a consistent relationship.

Thus, rest-rotation grazing resulted in an increase in grasslike plants and herbage yield at the expense of

forbs on the meadows of the Harvey Valley allotment (fig. 1A). As related to meadow conditions, this is a desirable result. However, it is the forbs such as aster (*Aster* sp.), monkeyflower (*Mimulus* sp.), and buttercup (*Ranunculus* sp.) which provided the shows of flowers (fig. 1B). Five finger (*Potentilla gracilis*) and the clover (*Trifolium longipes*) are considered somewhat higher on the successional scale in this area and appear to do a bit better with improved management of grazing. But such forbs as five finger do not produce as showy a flower as buttercup.

These results indicate that free choice grazing and grazing per se did not decrease the growth of wildflowers. Rather, too much rest from grazing appears to have caused the reduction in flower-producing forbs on the meadows of Harvey Valley.

Grasses and grasslikes of the meadows normally require less rest from grazing than do bunchgrasses that grow on more arid sites. However, meadows on Harvey Valley have received roughly the same amounts of rest as the more arid sites where Idaho fescue grows. This treatment has permitted the grasslikes to compete successfully against the forbs. On the meadows grazed free choice, on the other hand, grasslikes were held in check, permitting the flower-producing forbs to remain.

This is not to say that good grazing management and excellent meadow condition automatically exclude wildflowers. Some wildflowers will occur where both grazing management and meadow condition are

Table 1—Herbage yield and botanical composition on three pairs of comparable plots under free choice or rest-rotation grazing in the Bogard area, Lassen National Forest, California

Plant Group or species	Grazing method ¹ and herbage yield (lbs/acre)					
	F-C	R-R	F-C	R-R	F-C	R-R
	2,346	2,765*	2,698	3,023*	1,911	2,705*
	Percent of composition					
Grasses	31.54	26.22*	23.45	22.71	28.60	24.67*
Grass-likes	41.42	72.39*	37.50	45.75*	57.02	70.92*
Forbs:	27.04	1.39*	39.05	31.54*	14.38	4.41*
Aster	2.45	.49*	—	—	1.88	2.77
Monkey-flower	13.48	—*	.65	1.31	6.45	—*
Five finger	—	—	.24	1.39*	—	1.47*
Buttercup	9.72	.90*	22.06	4.41*	5.23	—*
Clover	.74	—*	10.21	16.83*	.16	—
Other forbs	.65	—	5.89	7.60	.66	.17

¹F-C=Free choice grazing; R-R=rest-rotation grazing.

* =Differs significantly from the value for free-choice grazing, shown at left, as determined by Student's t test (herbage yield) and chi-square test (composition).



Figure 1—A plot under rest-rotation grazing, A, shows few plants of buttercup and good "grass," but plot under free choice grazing, B, shows great abundance of buttercup and low volume of "grass."

the best possible. However, where meadow wildflowers are desired in abundance, an ecological state favorable to them must be maintained. At the same time plant communities must be maintained so as to protect meadows from erosion and to enhance their ability to produce other outputs. Neither free choice grazing nor rest-rotation grazing as practiced at Harvey Valley will do both.

But mountain meadows can be managed to give wildflowers room to grow and reproduce, while maintaining vigorous grass and grasslike plants to protect the meadows and feed the cows. What is required is a little finesse on the part of land managers and due attention to these principles and concepts:

Within most meadows, slight topographic changes permit a complex of possible "ecological niches" for a variety of plant species. Whether the specific requirements for a given species are present in abundance depends in part upon the regime of grazing. Depending upon the regime of grazing imposed there will be: (a) a succession tending toward a climax plant community—representing a state of dynamic equilibrium with the climate; (b) a succession tending toward a pioneer plant community—brought about by a continued, adverse imbalance of factors; or (c) a sub-climax plant community—one held "stable" against the climate by a particular factor or factors.

The first condition may be brought about by providing rest from grazing. The amount and timing

of rest must, however, permit the "climax plants" to remain vigorous and able to compete with those lower on the successional scale. The second condition will occur when no rest is provided and grazing use is excessive for several consecutive seasons. A sub-climax plant community having a desirable mix of grasses and grasslike plants and flower-producing forbs can be maintained by finding the required balance between the amount of rest and the amount of grazing.

NOTES

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